



Complete Summary

TITLE

Complications of anesthesia: rate per 1,000 surgery discharges.

SOURCE(S)

AHRQ quality indicators. Guide to patient safety indicators [version 2.1, revision 3]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Jan 17. Various p.(AHRQ Pub; no. 03-R203).

Brief Abstract

DESCRIPTION

This measure is used to assess the number of cases of anesthetic overdose, reaction, or endotracheal tube misplacement per 1,000 surgery discharges with an operating room procedure.

RATIONALE

Hospitals in the United States provide the setting for some of life's most pivotal events - the birth of a child, major surgery, treatment for otherwise fatal illnesses. These hospitals house the most sophisticated medical technology in the world and provide state-of-the-art diagnostic and therapeutic services. But access to these services comes with certain costs. About 36% of personal health care expenditures in the United States go towards hospital care, and the rate of growth in spending for hospital services has begun to increase following a half a decade of declining growth. Simultaneously, concerns about the quality of health care services have reached a crescendo with the Institute of Medicine's series of reports describing the problem of medical errors and the need for a complete restructuring of the health care system to improve the quality of care. Policymakers, employers, and consumers have made the quality of care in U.S. hospitals a top priority and have voiced the need to assess, monitor, track, and improve the quality of inpatient care.

Widespread consensus exists that health care organizations can reduce patient injuries by improving the environment for safety from implementing technical changes, such as electronic medical record systems, to improving staff awareness of patient safety risks. Clinical process interventions also have strong evidence for reducing the risk of adverse events related to a patient's exposure to hospital care. Patient Safety Indicators (PSIs), which are based on computerized hospital discharge abstracts from the AHRQ's Healthcare Cost and Utilization Project (HCUP), can be used to better prioritize and evaluate local and national initiatives. Analyses of these and similar inexpensive, readily available administrative data

sets may provide a screen for potential medical errors and a method for monitoring trends over time.

The Complications of Anesthesia indicator is intended to capture cases flagged by external cause-of-injury codes (e-codes) and complications codes for adverse effects from the administration of therapeutic drugs, as well as the overdose of anesthetic agents used primarily in therapeutic settings.

PRIMARY CLINICAL COMPONENT

Anesthesia; complications; anesthetic overdose; anesthetic reaction; endotracheal tube misplacement

DENOMINATOR DESCRIPTION

All surgical discharges defined by specific Diagnosis-Related Groups (DRGs) and an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code for an operating room procedure

Exclude patients with ICD-9-CM diagnosis codes for anesthesia complications in the principal diagnosis field.

Exclude patients with codes for poisoning due to anesthetics (E8551, 9681-4, 9687) and any diagnosis code for active drug dependence, active non-dependent abuse of drugs, or self-inflicted injury.

NUMERATOR DESCRIPTION

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for anesthesia complications in any secondary diagnosis field

Evidence Supporting the Measure

PRIMARY MEASURE DOMAIN

Outcome

SECONDARY MEASURE DOMAIN

Not applicable

EVIDENCE SUPPORTING THE CRITERION OF QUALITY

- A formal consensus procedure involving experts in relevant clinical, methodological, and organizational sciences
- One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Evidence Supporting Need for the Measure

NEED FOR THE MEASURE

Use of this measure to improve performance
Variation in quality for the performance measured

EVIDENCE SUPPORTING NEED FOR THE MEASURE

Agency for Healthcare Research and Quality (AHRQ). National healthcare disparities report. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 Dec. 152 p.

Agency for Healthcare Research and Quality (AHRQ). National healthcare quality report. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 Dec. 112 p.

AHRQ quality indicators. Guide to patient safety indicators [version 2.1, revision 3]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Jan 17. Various p.(AHRQ Pub; no. 03-R203).

State of Use of the Measure

STATE OF USE

Current routine use

CURRENT USE

Internal quality improvement
National health care quality reporting
Quality of care research

Application of Measure in its Current Use

CARE SETTING

Hospitals

PROFESSIONALS RESPONSIBLE FOR HEALTH CARE

Advanced Practice Nurses
Physicians

LOWEST LEVEL OF HEALTH CARE DELIVERY ADDRESSED

Individual Clinicians

TARGET POPULATION AGE

Unspecified

TARGET POPULATION GENDER

Either male or female

STRATIFICATION BY VULNERABLE POPULATIONS

Unspecified

Characteristics of the Primary Clinical Component

INCIDENCE/PREVALENCE

Population Rate (2002): 0.79 per 1,000 population at risk.

EVIDENCE FOR INCIDENCE/PREVALENCE

AHRQ quality indicators. Guide to patient safety indicators [version 2.1, revision 3]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Jan 17. Various p.(AHRQ Pub; no. 03-R203).

ASSOCIATION WITH VULNERABLE POPULATIONS

Unspecified

BURDEN OF ILLNESS

Unspecified

UTILIZATION

Unspecified

COSTS

Unspecified

Institute of Medicine National Healthcare Quality Report Categories

IOM CARE NEED

Getting Better

IOM DOMAIN

Safety

CASE FINDING

Users of care only

DESCRIPTION OF CASE FINDING

All surgical discharges defined by specific Diagnosis-Related Groups (DRGs) and an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code for an operating room procedure

DENOMINATOR SAMPLING FRAME

Patients associated with provider

DENOMINATOR (INDEX) EVENT

Clinical Condition
Institutionalization
Therapeutic Intervention

DENOMINATOR INCLUSIONS/EXCLUSIONS

Inclusions

All surgical discharges defined by specific Diagnosis-Related Groups (DRGs)* and an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code* for an operating room procedure*

Exclusions

Exclude patients with ICD-9-CM diagnosis codes* for anesthesia complications in the principal diagnosis field.

Exclude patients with codes for poisoning due to anesthetics (E8551, 9681-4, 9687) and any diagnosis code for active drug dependence, active non-dependent abuse of drugs, or self-inflicted injury.

*Refer to Appendix A of the original measure documentation for DRGs and ICD-9-CM codes.

NUMERATOR INCLUSIONS/EXCLUSIONS

Inclusions

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes* for anesthesia complications in any secondary diagnosis field

*Refer to Appendix A of the original measure documentation for ICD-9-CM codes.

Exclusions
Unspecified

DENOMINATOR TIME WINDOW

Time window is a single point in time

NUMERATOR TIME WINDOW

Institutionalization

DATA SOURCE

Administrative data

LEVEL OF DETERMINATION OF QUALITY

Individual Case

OUTCOME TYPE

Adverse Outcome

PRE-EXISTING INSTRUMENT USED

Unspecified

Computation of the Measure

SCORING

Rate

INTERPRETATION OF SCORE

Better quality is associated with a lower score

ALLOWANCE FOR PATIENT FACTORS

Analysis by high-risk subgroup (stratification on vulnerable populations)
Analysis by subgroup (stratification on patient factors, geographic factors, etc.)
Risk adjustment method widely or commercially available

DESCRIPTION OF ALLOWANCE FOR PATIENT FACTORS

Risk adjustment of the data is recommended using age, sex, modified Diagnosis-Related Group (DRG), and comorbidity categories.

Application of multivariate signal extraction (MSX) to smooth risk adjusted rates is also recommended.

STANDARD OF COMPARISON

External comparison at a point in time
External comparison of time trends
Internal time comparison

Evaluation of Measure Properties

EXTENT OF MEASURE TESTING

The Patient Safety Indicators (PSIs) were evaluated by the project team using empirical analyses to explore the frequency and variation of the indicators, the potential bias, based on limited risk adjustment, and the relationship between indicators. The data sources used in the empirical analyses were the 1997 Florida State Inpatient Database (SID) for initial testing and development and the 1997 Healthcare Cost and Utilization Project (HCUP) State Inpatient Database for 19 States for the final empirical analyses.

All potential indicators were examined empirically by developing and conducting statistical tests for precision, bias, and relatedness of indicators. Three different estimates of hospital performance were calculated for each indicator:

1. The raw indicator rate was calculated using the number of adverse events in the numerator divided by the number of discharges in the population at risk by hospital.
2. The raw indicator was adjusted to account for differences among hospitals in age, gender, modified Diagnosis-Related Group (DRG), and comorbidities.
3. Multivariate signal extraction methods were applied to adjust for reliability by estimating the amount of "noise" (i.e., variation due to random error) relative to the amount of "signal" (i.e., systematic variation in hospital performance or reliability) for each indicator.

The project team constructed a set of statistical tests to examine the precision, bias, and relatedness of indicators for all accepted Provider-level Indicators, and precision and bias for all accepted Area-level Indicators. It should be noted that rates based on fewer than 30 cases in the numerator or the denominator are not reported.

The project team conducted a structured review of each indicator to evaluate the face validity (from a clinical perspective) of the indicators. The methodology for the structured review was adapted from the RAND/UCLA Appropriateness Method and consisted of an initial independent assessment of each indicator by clinician panelists using an initial questionnaire, a conference call among all panelists, followed by a final independent assessment by panelists using the same questionnaire. The review sought to establish consensual validity, which "extends face validity from one expert to a panel of experts who examine and rate the appropriateness of each item..." The panel process served to refine definitions of

some indicators, add new measures, and dismiss indicators with major concerns from further consideration.

Refer to the original measure documentation for additional details.

EVIDENCE FOR RELIABILITY/VALIDITY TESTING

AHRQ quality indicators. Guide to patient safety indicators [version 2.1, revision 3]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Jan 17. Various p.(AHRQ Pub; no. 03-R203).

Identifying Information

ORIGINAL TITLE

Complications of anesthesia (PSI 1).

MEASURE COLLECTION

[Agency for Healthcare Research and Quality \(AHRQ\) Quality Indicators](#)

MEASURE SET NAME

[Agency for Healthcare Research and Quality \(AHRQ\) Patient Safety Indicators](#)

DEVELOPER

Agency for Healthcare Research and Quality

INCLUDED IN

National Healthcare Disparities Report (NHDR)
National Healthcare Quality Report (NHQR)

ADAPTATION

A subset of this indicator was originally proposed by Iezzoni and colleagues (1994) as part of Complications Screening Program (CSP) (CSP 21, "Complications relating to anesthetic agents and other CNS depressants"). Their definition also includes poisoning due to centrally acting muscle relaxants and accidental poisoning by nitrogen oxides, which were omitted from this Patient Safety Indicator (PSI). Their definition excludes other codes included in the PSI, namely, poisoning by other and unspecified general anesthetics and external cause of injury codes for "endotracheal tube wrongly placed during anesthetic procedure" and adverse effects of anesthetics in therapeutic use.

RELEASE DATE

2003 Mar

REVISION DATE

2005 Jan

MEASURE STATUS

This is the current release of the measure.

This measure updates a previous version: AHRQ quality indicators. Guide to patient safety indicators [version 2.1, revision 1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2003 May 28. 143 p. (AHRQ Pub; no. 03-R203).

SOURCE(S)

AHRQ quality indicators. Guide to patient safety indicators [version 2.1, revision 3]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Jan 17. Various p.(AHRQ Pub; no. 03-R203).

MEASURE AVAILABILITY

The individual measure, "Complications of Anesthesia (PSI 1)," is published in "AHRQ Quality Indicators. Guide to Patient Safety Indicators." This document is available in [Portable Document Format \(PDF\)](#) and a [zipped Word\(R\) file](#) from the [Quality Indicators](#) page at the Agency for Healthcare Research and Quality (AHRQ) Web site.

For more information, please contact the QI Support Team at support@qualityindicators.ahrq.gov.

COMPANION DOCUMENTS

The following are available:

- AHRQ Quality Indicators - patient safety indicators: software documentation [version 2.1, revision 3a] - SAS. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Feb 15. 45 p. (AHRQ Pub; no. 03-R204). This document is available from the [Agency for Healthcare Research and Quality \(AHRQ\) Web site](#).
- AHRQ Quality Indicators - patient safety indicators: software documentation [version 2.1, revision 3a] - SPSS. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Feb 15. 39 p. (AHRQ Pub; no. 03-R205). This document is available from the [AHRQ Web site](#).
- Remus D, Fraser I. Guidance for using the AHRQ quality indicators for hospital-level public reporting or payment. Rockville (MD): Agency for Healthcare Research and Quality; 2004 Aug. 24 p. This document is available from the [AHRQ Web site](#).
- HCUPnet, Healthcare Cost and Utilization Project. [internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 [Various pagings]. HCUPnet is available from the [AHRQ Web site](#).

- UCSF-Stanford Evidence-based Practice Center. Davies GM, Geppert J, McClellan M, et al. Refinement of the HCUP quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2001 May. (Technical review; no. 4). This document is available from the [AHRQ Web site](#).

NQMC STATUS

This NQMC summary was completed by ECRI on October 1, 2003. The information was verified by the measure developer on October 29, 2003. This summary was updated by ECRI on February 7, 2005. The information was verified by the measure developer on April 25, 2005.

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The logo for FIRSTGOV, with "FIRST" in blue and "GOV" in red, and a small graphic of a star above the "I".

